CROSS BORDER COORDINATION:
PJM AND MISO

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Institute for Industrial Economics, Toulouse
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Toulouse, France
January 16-17, 2004
The developing Regional Transmission Organizations in the United States are a response to the need for coordination, within regions and across “seams.”  (FERC RTO web page)
Conventional definitions of transmission contract paths differ sharply from the flows on the network.

Transmission Capacity Definitions

Contract Path  →  Flow-Based Paths  →  Point-to-Point

Contract Path Fiction
OASIS Schedules and TLR

Parallel Flows
Physical Flowgate Rights
FGs
Financial
FG-FTRs

Flows Implicit
Financial Transmission Rights
PTP-FTRs

Obligations and Options
The first model is transmission loading relief (TLR). The TLR protocols focus on transactions between control areas.

**TLR Features**

- **Necessary.** Contract path scheduling required an immediate un-scheduling mechanism to protect reliability.

- **Large Curtailments.** Transactions cut across the board.

- **Non-market.** Does not consider market value or manage economic redispatch.

- **Granularity.** Does not track transactions within control areas.

- **Complex.** Communication and decision cycle is slow and adjustments are not well suited for addressing multiple constraints.

Expansion of RTO regions would reduce granularity. The second model for “market-to-non-market” coordination by PJM and MISO calls for ISO to track “flowgate” effects of internal economic dispatch.

(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p 14.)
MARKET FLOW CALCULATIONS

The impact calculations for internal schedules recognize the external effects on third parties.

Calculating the Market Flow Illustration

Therefore…

\[
\text{GLDF}_1 = 0.4 \times 50 \text{MW} = 20 \text{ MW Impact}
\]

\[
\text{GLDF}_2 = 0.15 \times 50 \text{MW} = 7.5 \text{ MW Impact}
\]

\[
\text{GLDF}_3 = (-0.2) \times 30 \text{MW} = -6 \text{ MW Impact}
\]

Therefore…

\[
\text{Market Flows across Flowgate “A”:
(20) + (7.5) = 27.5 \text{ MW Forward}
\]

\[
(-6) = -6 \text{ MW Reverse}
\]

\[
(27.5) + (-6) = 21.5 \text{ MW Net}
\]

(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p 20.)
Network and Native Load (NNL) as well as firm point-to-point will be modeled and tracked for impacts on the hundreds of impacted flowgates or constraints.

**“Historic NNL” Calculation Illustration**

\[
\text{nnl} = \text{Designated Network Resources to Network Customers' Delivery Points}
\]

\[
(A) + (B) + (C) + (D) = \text{Control Area Existing NNL}
\]

(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p. 24.)
PJM and the Midwest Independent System Operator (MISO) have developed a joint operating agreement to include coordination to address seams issues.

“As PJM and MISO expand and implement their respective markets, one of the primary seams issues that must be resolved is how different congestion management methodologies (market-based and traditional) will interact to ensure that parallel flows and impacts are recognized and controlled in a manner that consistently ensures system reliability. … PJM is a Market Based Operating Entity that plans to expand its area, and MISO is starting its Market Operations and is becoming a Market-Based Operating Entity. In brief, the proposal includes the following concepts:

- Market-Based Operating Entities will agree to observe limits on an extensive list of coordinated external flowgates
- Like all control areas, Market-Based Operating Entities will have Network and Native Load (NNL) impacts upon those flowgates.
- Market-Based Operating Entities will determine these NNL impacts using the published analysis process, and constrain their operations to limit firm flows on the Coordinated Flowgates to no more than the calculated NNL contribution established in the analysis.
- In real-time, Market-Based Operating Entities will calculate and monitor when the projected and actual flows exceed the NNL limits established in the day-ahead process. …
- The complete proposal will allow Market-Based Operating Entities to address the reliability aspects of congestion management seams issues between all parties whether the seams are between market to non-market operations or market to market operations.”

(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003., pp. 3-4)
MARKET INTEGRATION

Virtual ISOs

The anticipated “market-to-market” design would extend exiting within market coordination to create a common integrated dispatch.

“MISO and PJM will utilize this recalculation process annually until it is replaced by another process. It is anticipated that an enhanced, market-to-market, process will be developed to replace the Historic NNL calculation process. The enhanced process may use a simultaneous deliverability type analysis rather than the historic NNL calculation process.” (PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p. 26-27.)

PJM currently coordinates separate control areas in PJM West and PJM “Classic” but through a common dispatch and pricing system. This model includes full simultaneous feasibility, bilateral scheduling, economic dispatch for the balancing market, locational pricing and use of financial transmission rights.